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*The Climate of Lake Nyanza.* Deduced from the observations of CAPTS. SPEKE and GRANT, by FRANCIS GALTON, F.R.S., Foreign Secretary Meteorological Society.

*Nature of the Observations.*—The temperatures in the accompanying table are deduced from daily observations made by Captain Grant at his principal stations. The minima temperatures were invariably recorded; the maxima were intermitted during  $3\frac{1}{2}$  months at Karagwé, when the only thermometer suitable for their registration had been taken by Captain Speke to do service at Uganda. Fortunately a complete series of 9 A.M., 3 P.M., and 9 P.M. observations were made by Captain Grant at Karagwé, before and during this interval, and afford materials for a satisfactory reproduction of the absent data. Observations at 9 A.M. were continued during the whole journey, but the 3 P.M., and still more frequently the 9 P.M., were latterly almost wholly omitted. The thermometers were excellent instruments, made by Casella: they have been examined and freshly guaranteed by their maker since the close of the journey.

The number of days of rain and slight showers is taken from Captain Speke's journal, in which they were invariably recorded. The rainfall was measured by Grant. The rain-gauge was likewise made by Casella, and was used up to Unyoro, where an accident compelled the substitution of a tin can with a measured aperture.

The prevalent direction of the wind was estimated by Captain Speke, without the aid of any special instrument.

*Temperature.*—The thermometrical registers are very antagonistic to the popular ideas of African and Equatorial temperatures. We find that in only one instance during the 5 months spent at Karagwé, did the maximum temperature attain  $85^{\circ}$ . We also find the nights to be invariably cool. At 9 P.M. the temperature ranged between  $60^{\circ}$  and  $71^{\circ}$ , and the coldest period of the night between  $57^{\circ}$  and  $65^{\circ}$ . There seems nothing in such a climate that should be trying to a European constitution. The heats are not too great for ordinary labour in the morning and evening, while the nights are never too hot for refreshing sleep. There is more severity in a hot English summer than in the climate of Karagwé—far more severity in the summer of the south of France. The great elevation of the basin of the Nyanza above the level of the sea will partly, if not wholly, account for the moderation of its temperature.

Uganda, although 1700 feet lower, seems little hotter than Karagwé. Speke's maximum thermometer, which was examined and registered once a fortnight, ranges closely with the simultaneous observations made by Grant at Karagwé, if we omit a single uncorroborated entry of  $92^{\circ}$ , which may reasonably be ascribed to exceptional circumstances, or to error. So, again, Grant's Uganda observations form a consecutive series with those he had previously made at Karagwé, which they would not have done if the difference of temperature at the two places accorded with the usual approximate rate, viz.,  $1^{\circ}$  of cold for every 300 feet of elevation.

Unyoro is decidedly hotter. The temperatures registered on

the march between Uganda and Unyoro are the highest of the whole year. They are not, however, considered by Captain Grant to have been observed under circumstances favourable to accuracy. The maximum once reached  $91^{\circ}$ , and twice reached  $89^{\circ}$ . The Unyoro maximum was  $86^{\circ}$ ; its minimum ranged between  $61^{\circ}$  and  $72^{\circ}$ .

*Rain.*—The annual rainfall is 49 inches,—an unusually small amount for an equatorial region, and inferior to that of many places in the British Isles. This deficiency is reasonably to be accounted for upon physico-geographical data. The outflow of water from every district must be ultimately supplied by clouds charged with vapour originally generated by evaporation of the water of the ocean. Now, the district of Lake Nyanza is peculiarly ill-situated for receiving rain-bearing winds from the African coasts. The vast desert of the Sahara cuts off all moisture from the north; and the easterly winds which were chiefly met with by Speke and Grant, must have deposited the larger portion of their load of water when they first impinged on the rampart-like eastern edge of the East African plateau.

The wind is variable during the rainiest season, at other times easterly winds prevail.

The sky was remarkable as being either very clear, with fleeting clouds, or heavily overcast, with low black clouds.

The wet and dry seasons are imperfectly marked in the Nyanza districts. Their most distinct manifestation was in the April and November rains, and in the comparatively dry weather that immediately preceded the former. It must be remarked that Speke's 21 days of "rain and slight showers," during March, in Uganda, corresponds to only 11 days during which enough rain fell at Karagwé to enable Grant to measure it. The frequency of these showers is, therefore, an imperfect criterion of the wetness of the month.

Taking the average of the whole year, there is rain of some description, whether heavy or slight, on two days out of every three. A sufficient rainfall takes place to be worthy of measurement by the gauge, on one day out of every two. About once a month a heavy burst of rain occurred, to the amount of one or two inches; and fully one-third of the annual rainfall was contributed by these occasional storms. The river-beds were often suddenly filled in consequence of partial deluges; and masses of tangled grass, with soil attached to them, were washed down to the Nile during the rainiest months; but there is no appearance of the level of the Lake Nyanza being affected by the different seasons in any considerable degree. Thus, in the sketch of the outflow of the Nile, trees of some years' growth are seen to clothe the promontories down to the water's edge. On the other hand, it is well known that the rainy and dry periods are sharply defined at Gondokoro, and even so far to the north of that place as Miani had explored, viz. to north latitude  $3^{\circ} 34'$ . We must, therefore, ascribe the rise and fall of the trunk stream of the Lower Nile to the periodicity of the rains that feed it south of the 3rd degree of north latitude, and, in a *very inconsiderable degree*, to the periodicity of the rains that fall upon the land whose drainage is into the Lake Nyanza.

## CLIMATE OF THE COUNTRIES BORDERING LAKE NYANZA, 1861-2.

Explanation.	a = from the 1st to the 7th b = " " 8th " 15th c = " " 16th " 23rd d = " " 24th " end.	TEMPERATURE.				RAIN AND CLOUD.				WINDS.
		Mean Temperature.	Extreme Heat.	Extreme Cold.	Extreme Range.	Rainfall in Inches.	No. of Rainy Days.	Rainy Days, per Month.	Days of Rain and slight Showers. (Speke.)	
Karagwé, 5100 feet above sea-level.	Nov. a	70	84	57	80	1.00*	3*	(12)	17	N.E.
	Dec. a	70	83	58	27	.77	4			
	b	66	78	53	26	.34	5			
	c	67	80	57	25	.32	3	14	16	N.E.
	d	69	84	57	29	1.35	2			
	Jan. a	69	82	57	27	.21	2			
	b	69	85	64	23	.89	2	14	14	N.E.
	c	68	80	57	25	.84	4			
	d	67	79	57	24	1.47	6			
	Feb. a	67	79	59	22	.96	4			
	b	69	82	58	26	1.90	3	12	12	N.E.
	c			59		.13	2			
	d			58		.63	3			
	Mar. a	70	80	62	20	.90	0			
	b	69	81	61	22	.34	3	11	21	E. by N.
	c	68	80	59	27	2.62	4			
	d	69	80	60	22	.98	4			
	April a	69	79	61	20	.84	3			
	b	66	71	60	13	4.00*	6*			
	c							16*	27	Variable
	May a					3 heavy storms (in all 8 in.)	3*			
	b						4			
	c						4			
	d						4			
	June a	69	79	62	19		2*			
Uganda, 3400 ft. elevation.	b	69	79	59	22	.42	3			
	c	70	78	60	20	.08	2	8*	20	S.E.
	d	69	80	62	20	.05	1			
Camp, 3400 ft.	July a	68	76	61	17	1.94	3			
	b							(15)	22	S.E.
	c	76	91	64	29					
Camp, 3400 ft.	Aug. a							(14)	20	S.E.
	b	74	89	60	31					
	c									
Unyoro, 3200 ft. above sea.	Sept. a									
	b	75	86	65	23			18*	18	Variable
	c	73	84	62	24	1.61*	3			
Oct.	d	73	80	61	21	.44	6			
	a	72	82	64	20	3.00	6			
	b	72	82	63	21	.82	4			
Nov.	c	73	82	63	21	3.48	6	21	27	Variable
	d	74	84	65	21	1.30	5			
	a	72	83	64	21	2.20	1			
Means and Totals .		68	82	51	49	34.93	135		240	E.
Estimated value } for complete year }		68	82	51	49	49		178	240	E.

These are obtained by adding 3° to the temp. at 3 p.m. No maxima were taken.

These are of doubtful value. The thermometers were hung in crowded huts. No record in note-book of any unusual heat.

Uganda maxima, taken each fortnight by Captain Speke.

The numbers marked by an asterisk \* are partly, and those included in brackets ( ) are wholly, deduced by proportion.

The sky is either very clear, with fleeting clouds, or overcast, with low black clouds.

Rain chiefly falls in sudden showers and thunderstorms.